City of Fort Smith, Arkansas
Minutes of the Streets, Bridges and Associated Drainage
Capital Improvements Plan (CIP) Advisory Committee Meeting
August 9, 2018

A meeting of the Streets, Bridges and Associated Drainage Capital Improvement Plan (CIP) Advisory Committee was called to order at 4:30 p.m. on August 9, 2018, in the City's Planning Conference Room #326.

Committee members present:
Stan Vlademar – Ward 1
Tiffinee Baker – Ward 2
Robert Brown– Ward 3 (Chairman)
David Armbruster – Ward 3
Matthew Alt – Ward 3
Nathaniel Deason – Ward 4
Philip Rosar – Ward 4

City Staff Present:
Stan Snodgrass, Director of Engineering
George Allen, Director of Operations
Jennifer Stevens, Accounting Technician

Introduction of the new committee member Matthew Alt was made by Stan Snodgrass.

Stan Snodgrass stated that a new chairperson needed to be selected due to Aaron St. Amant's term ending. Philip Rosar made the motion to nominate Robert Brown. Tiffinee Baker seconded that motion. All committee members were in favor with none opposed.

Minutes of the May 24, 2018 Meeting

Stan Vlademar made the motion to approve the minutes from the last meeting and Philip Rosar seconded the motion. The minutes were approved with all in favor and none opposed.

Old Business:

Updates to Street Pavement Design Standards
Dustin Tackett with Garver Engineering gave a summary on their findings and recommendations for the update to the City's Street Pavement Design Standards. A copy of that information is attached and the recommended updates to the City's Street Pavement Design Standards are noted.

Stan Snodgrass indicated these changes were those for the pavement materials and design section of the street standards and there were other changes such as geometric criteria that was not being presented to the committee. Stan Snodgrass stated that the next step would be to finalize the entire street standards document then provide it to the engineering consultant community for their review and comment, then ultimately to the Board of Directors for approval. The first step in the approval process would be the recommendation for approval by the CIP Committee.

David Armbruster made a motion to approve the update to the City's Street Pavement Design Standards. Robert Brown seconded the motion. All members were in favor and none were opposed.

Update on additional analysis on May Branch/Town Branch Drainage Basin

Stan Snodgrass stated that FTN Associates was still working on determining structures in the May Branch flood area. Preliminary estimates were 140-160 structures in the May Branch area and they were determining floor elevations of those structures. Stan stated that it would be a couple of months before they were completed and this item would be discussed further at that time.

New Business:

Initial discussion of 2019-2023 CIP

Stan Snodgrass gave a broad overview of the current 2018-2022 CIP noting major project items and funding commitments that had been made with ArDOT. Stan stated a detailed breakdown of project items for the proposed 2019-2023 CIP would be presented and reviewed at the next CIP meeting.

Citizen's Forum:

No citizens were present to speak.

The next two meetings will be September 13, 2018 at 4:30 p.m. and also on October 4, 2018 at 4:30 p.m. Stan noted that the 2019-2023 CIP would need to be approved at the October 4 meeting as the proposed plan would be presented to the Board at their October 23 Study Session.

With no further discussion or business, a motion to adjourn was made by Robert Brown at 6:55 p.m. David Armbruster seconded the motion. All were in favor with none opposed.

6.0 Pavement Materials and Design

6.1 General

Street pavement structure shall be flexible type consisting of an asphalt concrete hot mix (ACHM) pavement or rigid type consisting of a Portland cement concrete pavement. P.C.Concrete Pavement shall be required by the City Engineer for streets with longitudinal grades in excess of 10%.

Commented [TDL5]: Required concrete pavement for steep grades.

Flexible pavements may be conventional construction composed of an aggregate base course with an ACHM binder and/or surface course or a full-depth asphalt structure utilizing an ACHM base course.

Pavement structures shall be designed in accordance with the procedures and criteria provided in Section 6.4. Typical sections for each functional classification are provided in Appendix X. Construction details for various street elements are provided in the City of Fort Smith Standard Drawings. Additional quality control and testing procedures are discussed in Section X.

Reference to various material, construction and testing standards shall be to the latest edition and shall include the following:

- ASTM - American Society for Testing and Materials
- AASHTO - American Association of State Highway and Transportation Officials
- ARDOT - Arkansas Department of Transportation
- City of Fort Smith Standard Specifications

Commented [TDL6]: Added reference throughout document to standard specifications

6.2 Pavement Materials and Construction

Commented [TDL7]: Removed specification language in this section. If specifications are modified in the future it won't contradict what's in this this document.

6.2.1 Subgrade Stabilization

Pavement subgrade shall be stabilized by conventional mechanical compaction or by other methods. Where alternative methods of stabilization are used the design data and specifications shall substantiate adequacy of the procedure selected. Chemical stabilization shall not be used.

The adequacy of in-situ soils as a pavement subgrade shall be evaluated in accordance with Section 6.3. Soils classified A-6 and A-7 (AASHTO System), i.e. clays, and which have a liquid limit greater than 40 or a plasticity index greater than 15 shall be replaced (undercut) or improved by other methods.

Soils within the upper 24 inches of the flexible pavement structure shall not be highly susceptible to frost action (soils classified A-4 and A-5 including sandy silts, fine silty sand or lean clays are highly susceptible to frost action). Methods and procedures for establishing the depth of soil replacement or other improvements shall be specified in the design data and project specifications. Subgrade compaction shall meet the requirements of the City of Fort Smith Standard Specifications.

Commented [TDL8]: Increased from 16" to 24".

6.2.2 Subbase Course

Pavement designs which utilize a subbase course shall provide test data and specifications for the subbase material.

6.2.3 Aggregate Base Course

Materials for aggregate base courses shall meet the requirements of the City of Fort Smith Standard Specifications.

6.2.4 ACHM Courses

Materials for asphalt concrete hot mix (ACHM) base, binder, and surface courses shall meet the requirements of the City of Fort Smith Standard Specifications. Flexible pavement surfacing shall be ACHM Surface Course (Type 3). ACHM Surface Course (Type 2) shall be used only when specifically authorized and directed by the Engineer.

6.2.5 P.C. Concrete Pavement

Materials for P.C. Concrete Pavement shall meet the requirements of the City of Fort Smith Standard Specifications. Rigid pavement shall be non-reinforced or reinforced and constructed on a prepared subgrade or base course.

Joint layout details shall be provided in the construction plans when P.C. Concrete Pavement is utilized as a surface course.

6.2.6 Curb and Gutter

All streets shall have concrete curb and gutter, except estate type streets, meeting the requirements of the City of Fort Smith Standard Specifications and Standard Drawings. Rigid pavements shall have integral curbs or independent curb and gutter. Estate type streets shall have paved shoulders surfaced with ACHM surface course matching the travel lane thickness.

6.2.7 Subsurface Drainage

Pipe underdrains shall be installed at all locations where subsurface moisture will affect the stability of the subgrade or result in unsatisfactory pavement performance. Longitudinal pipe underdrains shall be installed along each side of the street located in a cut condition. Pipe underdrains will not be required at locations where longitudinal storm drains are present.

Commented [TDL9]: Added language regarding the required use of underdrains.

The engineer shall perform adequate subsurface investigations to properly evaluate the subsurface conditions. A report shall provide a mitigation strategy, for approval by the City Engineer, if groundwater is encountered within the 5 feet of the existing or proposed ground surface. This information shall be included and addressed in the geotechnical report.

6.3 Subgrade Investigation and Evaluation

Commented [TDL10]: Separated geotechnical investigation from pavement thickness design section.

The investigation and evaluation of subgrade soils shall be an integral part of the pavement design and shall include the following minimum requirements. All testing and related work shall be accomplished by a geotechnical firm approved by the City.

The subgrade, as referenced in this standard, shall represent material 24 inches below the bottom of base layer (aggregate base or ACHM base course). Subgrade limits shall extend 2' behind back of curb for asphalt streets and 4' behind back of curb for concrete streets.

Additional investigation will be required where a variation in soil types or other subsurface conditions exist.

6.3.1 Sampling and Testing

The investigation and sampling of soils shall conform to AASHTO R 13 (ASTM D 420) and test procedures referenced therein.

Sampling of subgrade soils shall be accomplished by boring or by excavation of test pits. A minimum of one boring or test pit shall be provided for any street segment. The distance between borings shall not exceed 500 linear feet and shall be evenly spaced. Depth of borings or test pits shall be a minimum of 5 feet below the proposed subgrade elevation in cut areas or 5 feet below existing grade in fill areas.

Commented [TDL11]: Added minimum of one boring per street, reduced distance between borings from 600' to 500', and increased minimum depth from 4' to 5'.

Gradation, Atterberg limits, maximum compaction, and load bearing strength testing shall be provided to determine suitability of soils for use as subgrade material within the street.

All sampling and testing of soils shall be performed under the direct supervision of a Professional Engineer who must sign and stamp the geotechnical report.

6.3.1.1 Soils Classification

Subgrade soils shall be classified in accordance with the AASHTO System (AASHTO M 145). All tests required for classification of soils as referenced in AASHTO M 145 shall be performed and reported unless specific tests are waived by the City. Select material used in subgrade or subbase construction shall be tested and classified. Select material shall meet the requirements of the City of Fort Smith Standard Specifications.

6.3.1.2 Moisture-Density Relationship

Compaction testing of soils proposed for use as subgrade material shall be performed in accordance with AASHTO T-99 (Standard Proctor Test) methods.

6.3.1.3 Load Bearing Strength

Load bearing strength of soils shall be determined by the California Bearing Ratio Test (CBR) in accordance with AASHTO T 193 or ASTM D 1883. A minimum of one test shall be performed for each

500 linear feet of street; additional tests will be required where significant variation in soil conditions occurs. Samples for CBR tests shall be obtained within the proposed 24" subgrade elevation range.

For CBR testing, the specimen shall be molded at approximately the optimum moisture content and 95 percent of the maximum dry density as determined by the corresponding laboratory proctor tests.

CBR tests will be required for all in-situ soils, select material and on-site borrow utilized in the subgrade construction.

6.3.2 Subgrade Support Capacity

Subgrade support capacity for flexible type pavements shall be determined from the load bearing strength (CBR) of the soils based on the correlation provided in Section 6.4

Commented [TDL12]: CBR to Resilient Modulus correlation changed based on more current research since publication of AASHTO Interim Guide. Would recommend local geotech input on changes to this section as a whole.

6.3.3 Subgrade Requirements

At minimum, the top 24 inches of subgrade shall meet the following specifications unless an individual design, with calculations, is provided:

A. AASHTO Soil Classification: A-1, A-2-4, or A-2-5
Passing no. 200 Sieve: 35% max.
California Bearing Ratio (CBR): ≥ 6

B. Material not meeting the soil classification and graduation requirements in section A, but meeting the following specifications:

AASHTO Soil Classification	A-2-6, A-6
California Bearing Ratio (CBR):	≥ 6
Plasticity Index:	15 max.

Replacement of soils up to 4' in depth may be required by the City dependent upon testing results in soils report and/or field conditions.

6.4 Pavement Design Criteria

6.4.1 Design Method

Pavement thickness shall be designed by the AASHTO Guide for Design of Pavement Structures, latest edition. Other design methods, including the Asphalt Institute method, may be approved on an individual basis. Thickness design criteria for the AASHTO method is provided in Section 1.4.

Minimum criteria for thickness design is based on street classifications as defined in Section X of these standards. Streets classified as boulevard, arterial, collector and industrial must be designed on an individual basis and all criteria utilized must be documented.

6.4.2 Design Period

A minimum design period (traffic analysis period) of 20 years shall be used for pavement designs.

6.4.3 Traffic Analysis

Maximum traffic characteristics, including traffic volumes and 18-kip equivalent single axle loads (ESALs), are provided in Section 1.5 for predetermined residential street pavement sections. Traffic data shall be submitted for all street classifications, including residential, where traffic data doesn't fall below the maximum criteria provided. The basis for traffic projections shall be included in data submitted.

The following equation shall be used when calculating the design traffic for 20 year projections:

ESALs x DD x LD x 365

Where:

ESALs = 18-kip Equivalent Single Axle Loads
DD = Directional Distribution
LD = Lane Distribution

Two Lane: ESALs x 0.5 x 1.0 x 20 x 365
Four Lane: ESALs x 0.5 x 0.8 x 20 x 365

Commented [TDL13]: Added equation for calculating design traffic including directional distribution and lane distribution.

6.4.4 Resilient Modulus Correlation

The correlation of California Bearing Ratio (CBR) and Resilient Modulus for pavement design input should be made using the NCHRP 1-37A equation shown below:

M_R (psi) = 2555 x $CBR^{0.64}$

Commented [TDL14]: Added correlation equation between CBR and Resilient Modulus which is the subgrade input for the AASHTO thickness design equation.

6.4.5 Design Reliability and Serviceability

The design reliability percentage and serviceability index inputs are shown for each functional classification in **Table 1**.

Table 1: Design Reliability and Serviceability Inputs

Design Reliability and Serviceability Inputs						
Classification	Reliability	Standard Deviation		Initial Serviceability	Terminal Serviceability	Performance
		Flexible	Rigid			
Boulevard	95	0.45	0.35	4.5	2.5	2.0
Major Arterial	95	0.45	0.35	4.5	2.5	2.0
Minor Arterial	95	0.45	0.35	4.5	2.5	2.0
Industrial	90	0.45	0.35	4.5	2.5	2.0
Major Collector	85	0.45	0.35	4.5	2.5	2.0
Residential Collector	85	0.45	0.35	4.5	2.5	2.0
Residential	80	0.45	0.35	4.5	2.0	2.5

Commented [TDL15]: Included design reliability and serviceability inputs in a tabular format based on functional class. Replaces Appendix B.

6.4.6 Pavement Material Parameters

Table 2 provides pavement material parameters including standard specification reference, structural coefficients, and thickness constraints.

Table 2: Pavement Material Parameters

Pavement Material Parameters				
Material	Specification[1]	Structural Coefficient	Thickness (in.)	
			Minimum	Maximum
ACHM Surface Course	Section 330	0.44	2	4
ACHM Binder Course	Section 330	0.44	3	6
ACHM Base Course	Section 310	0.36	4	12
Aggregate Base Course	Section 305	0.14	6	12

Commented [TDL16]: Included material parameters in tabular format. Replaces Appendix B and adds thickness parameters for each material.

6.5 Minimum Residential Pavement Sections

Commented [TDL17]: Created a separate section for standard, predetermined, residential pavement sections in lieu of Appendix C.

Table 3 provides minimum pavement sections, based on the AASHTO method, for residential streets to be used in lieu of an individual pavement design if the provided maximum subgrade and traffic criteria are not exceeded. A geotechnical investigation shall be conducted to determine subgrade parameters prior to utilizing the minimum residential pavement sections. Traffic analyses shall be conducted to determine average daily traffic and 18 kip equivalent single axle loads (ESALs). For CBR values less than 6 and ESALs exceeding the maximum shown in **Table 3**, an individual pavement design, including calculations, shall be provided.

Table 3: Minimum Residential Pavement Sections

Minimum Residential Pavement Sections					
Residnential Street Classification			Residential[1]		
			Low Volume 0 - 30 Lots	Mid Volume 31-150 Lots	High Volume 151 - 300 Lots
Traffic Characteristics[2]					
Average Daily Traffic (Two-Way)			200	700	1500
20 Yr. Design Traffic - ESALs			14,600	36,500	73,000
Minimum Pavement Sections (in.)[3]					
CBR[4]	Type[5]	Materials			
< 6	Requires Individual Design				
≥ 6	F	ACHM Surface Course (Type 3)	2.0	2.5	2.5
		Aggregate Base Course	7.0	8.0	9.0
	FD	ACHM Surface Course (Type 3)	2.0	2.0	2.0
		ACHM Base Course	4.0	4.5	5.0
	R	Portland Cement Concrete	7.0	7.0	7.0
≥ 10	F	ACHM Surface Course (Type 3)	2.0	2.0	2.5
		Aggregate Base Course	6.0	7.5	7.0
	FD	ACHM Surface Course (Type 3)	2.0	2.0	2.0
		ACHM Base Course	4.0	4.0	4.0
	R	Portland Cement Concrete	7.0	7.0	7.0

[1] Number of single family home lots - For a loop or cul-de-sac, it will equal the number of lots on that street. For a continuing (through) street, it will equal the number of lots that will use the street when entering/exiting the subdivision.

[2] Maximum values. If results of geotechnical investigations and traffic analysis indicate higher values, an individual pavement design shall be required.

[3] Additional base thickness or subbase may be necessary to meet all design requirements.

[4] California Bearing Ratio (CBR)

[5]Type of Pavement

Flexible Pavement

F: ACHM Surface Course over Aggregate Base Course

FD: ACHM Surface Course over ACHM Base Course (Full Depth Asphalt Pavement)

Rigid Pavement

R: P.C. Concrete Pavement

Commented [TDL18]: Traffic characteristics did not change based on investigation of construction traffic impacts. Less than CBR = 6 will now require formal design.

6.6 Pavement Design Report

Commented [TDL19]: Added individual pavement design report requirements

When required, an individual pavement design report shall include the following information to be considered for approval. The report shall be signed and stamped by a Professional Engineer.

1. Study Area
   a. Site vicinity map depicting project area.
   b. Plat with street names labeled.
2. Traffic Data
   a. Existing and Future Average Daily Traffic (ADT)
   b. Heavy truck percentage
   c. 18-kip Equivalent Single Axle Loads (ESAL) determination
3. Soils Report
   a. Field Investigation
      i. Method of subsurface exploration
      ii. Boring locations on scaled drawings.
      iii. Boring logs
   b. Laboratory Testing (In-situ and borrow)
      i. Load bearing strength – California Bearing Ratio (CBR)
      ii. Natural water content
      iii. Atterberg limits
      iv. Sieve analyses
      v. AASHTO soil classification
      vi. Moisture-Density relationship (Procter Test)
   c. General Conditions
      i. Site conditions
      ii. Subsurface conditions
      iii. Subgrade support
      iv. Subgrade preparation
   d. Construction considerations
4. Pavement Design
   a. AASHTO pavement design calculations
   b. Recommended pavement sections

CITY OF FORT SMITH

8/9/18

Five-Year Capital Improvement Program for Streets, Bridges and Drainage (2018-2022)

		2017	2018	2019	2020	2021	2022	
	Beginning Balance	24,391,814	22,624,373	15,145,260	7,879,055	6,922,465	6,056,744	
	Current Year Revenues							
	Sales Tax	21,392,528	21,606,453	21,822,518	22,040,743	22,261,150	22,483,762	
	Grants/Other Participation	6,328,910	724,000	0	0	0	0	
	Interest	99,542	92,383	57,417	36,912	32,367	16,782	
	Total - Current Year Revenues	27,820,980	22,422,836	21,879,935	22,077,654	22,293,517	22,500,544	
	Total Funds Available	**52,212,794**	**45,047,210**	**37,025,194**	**29,956,710**	**29,215,982**	**28,557,288**	
1	Street Overlays & Reconstruction	7,339,397	4,693,491	9,123,739	9,000,000	9,000,000	9,000,000	
2	Neighborhood Drainage Improvements	3,548,720	8,378,659	3,812,900	2,000,000	2,000,000	2,000,000	
3	North B Truck Route Modifications	0	1,044,000	700,000	0	0	0	
4	Intersection and Signal Improvements	291,500	2,240,000	400,000	400,000	400,000	400,000	
5	Spradling Extension at Riverfront Drive	905,211	0	0	0	0	0	
6	Kelley Highway Extension to Riverfront Drive	142,959	163,000	500,000	600,000	4,000,000	8,700,000	
7	Jenny Lind Road - Zero to Cavanaugh	12,405,000	5,630,000	0	0	0	0	
8	Geren Road Reconstruction	160,000	1,540,000	5,000,000	0	0	0	
9	Zero Street (Hwy 255) Widening	800,000	0	4,000,000	0	0	0	ArDOT
10	FCRA Development	57,562	1,800,000	1,900,000	500,000	500,000	500,000	
11	May Branch / Town Branch Drainage Project	200,000	500,000	500,000	4,000,000	4,000,000	4,000,000	
12	Hwy 45 widening - Zero St to Hwy 71	700,000	0	0	3,300,000	0	0	ArDOT
13	Railroad Crossing Panels	30,000	375,000	160,000	160,000	160,000	160,000	
14	Traffic Studies	28,853	25,000	25,000	25,000	25,000	25,000	
15	Asphalt Surface Treatments	0	500,000	0	0	0	0	
16	Street/Drainage by Street Operations Dept.	387,709	350,000	350,000	350,000	350,000	350,000	
17	Contingency	176,509	212,800	200,000	200,000	200,000	200,000	
	SUBTOTAL	**27,173,421**	**27,451,950**	**26,671,639**	**20,535,000**	**20,635,000**	**25,335,000**	
18	Indirect and Operating Costs	2,415,000	2,450,000	2,474,500	2,499,245	2,524,237	2,549,480	
	TOTAL	**29,588,421**	**29,901,950**	**29,146,139**	**23,034,245**	**23,159,237**	**27,884,480**	
	Ending Balance	**22,624,373**	**15,145,260**	**7,879,055**	**6,922,465**	**6,056,744**	**672,808**	

Grants/Other Participation

Jenny Lind Road - Zero to Cavanaugh	6,328,910	0	0	0	0	0
FCRA	0	724,000	0	0	0	0
TOTAL	**6,328,910**	**724,000**	**0**	**0**	**0**	**0**